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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,865	01/18/2002	Mario Saggio	00-CT-320	5366

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EXAMINER
IM, JUNGHWA M

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 08/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/053,865	Applicant(s) SAGGIO ET AL.	
	Examiner Junghwa M. Im	Art Unit 2811	

-- The MAILING DATE of this communication app ars on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4 and 6-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the electric field upon the entire volume of the semiconductor material layer is equal to *the* critical electric field. The critical electric field is recited without defining a particular region such as silicon.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4 and 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner et al. (US 6,184,545), hereafter Werner in view of Festa (US 4,110,775).

Regarding claims 1, 3, 8 and 9, insofar as understood, Fig. 2 of Werner shows a Schottky barrier diode comprising:

a substrate region (5) of a first conductive type (n^+) formed in a semiconductor material layer (4) of the same conductivity type (n); a metal layer (2); and at least two doped regions (8,

10) of a second conductive type (p) formed in the semiconductor material layer, each one of said doped regions being disposed under the metal layer and being separated from the other doped region by the portions of the semiconductor layer, wherein the doped regions are doped to equalize the charge in the semiconductor material layer so that the electric field upon the entire volume of the semiconductor material layer is constant and equal to the critical electric field of the silicon (col. 1, line 64-col. 2 line 3).

Note that charges are read as mobile charge carriers which are "equalized" because the reference teaches that there are no positive carriers and no negative carriers. Werner shows the doped regions equalize charge in the semiconductor material layer through having the same doping the doped region (8) and the semiconductor material layer (col. 3, lines 62-64) and equalizing a number of foreign atoms in the doped region and the semiconductor material layer (col. 1, lines 64-66). Therefore, it would be inherent that the electric field upon the entire volume of the semiconductor material layer is constant since the charge in the semiconductor material layer is equalized. Werner shows the electric field upon the entire volume of the semiconductor material layer is equal to the critical electric field of the silicon in terms of a breakdown charge of the semiconductor (col.1, line 67-col.2, line3).

Werner et al. do not teach that the doped region with the second conductivity is separated from the substrate. However, Festa shows in Fig.2 that the doped bodies with the second conductivity is separated from the substrate. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Festa into the device of Werner since the breakdown voltage of PN junction can be controlled through adjusting a distance between the substrate and the doped body as recited in col. 3, lines 4-8 of Festa's

reference.

Regarding claim 2, Werner teaches that conducting-state current flow is through zones (9), so zones must have a lower resistance than the doped regions (8), because current flows along the lowest resistance path (col. 4, lines 19-21).

Regarding claim 4, Werner teaches in Fig. 2, the doped regions comprises respective body region (8).

Regarding claim 6, Werner shows in Fig. 2, the body regions (8) comprises heavily doped body regions (10) having the same conductivity type (p) of the doped regions.

Regarding claim 7, Werner et al. show substantially the entire claimed structure except that the semiconductor material comprises a resistivity value lower than five ohm-cm for a breakdown voltage higher than 200V.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have an intended resistivity value for a breakdown voltage recited in pending claim, since it would have been held that general conditions of a claim are disclosed in the prior art by showing how to control the breakdown voltage through limiting the maximum depth of the depletion region, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller, 105 USPQ 233*

Note that Festa teaches how to adjust a breakdown voltage through curtailing the maximum depth of the depletion region in the epitaxial layer (col. 3, lines 4-8).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (703) 305-3998. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

jmi
August 25, 2003

Tom Thomas

TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800